Applicant : Ravi Narasimhan   Attorney's Docket No.: MP0256 / 13361-050001
Serial No. : 10/656,001
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Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1.   (Cancelled)

2.   (Currently Amended) The method of claim [1]4, wherein the higher-order

statistics comprise second-order statistics of the propagation medium.

3.   (Cancelled)

4.   (Currently Amended) A method comprising:

selecting a subset of active antennas from a plurality of available antennas in a multi-

element antenna system based on higher-order statistics of a propagation medium; and

        selecting a constellation for transmission on the active antennas[The method of claim 3],

where[in] said selecting the constellation for transmission on the active antennas comprises

selecting different constellations for two or more of the active antennas.

5.   (Currently Amended) The method of claim [1]4, where[in] the multi-element

antenna system comprises a multiple-in multiple-out (MIMO) system.

6.   (Currently Amended) The method of claim [1,]4, where[in] said selecting

comprises selecting the subset of active antennas based on correlation matrices among the active

antennas.

7.　　　(Currently Amended)　A method comprising:

selecting a subset of active antennas from a plurality of available antennas in a multi-element antenna system based on higher-order statistics of a propagation medium, [The method of claim 1,] where[in] said selecting comprises selecting an optimum number of antennas to maximize a minimum signal-to-noise ratio (SNR) margin.

8.　　　(Currently amended) The method of claim [1]4, where[in] said selecting comprises selecting the subset of active antennas based on a fixed data rate.

9.　　　(Currently amended) [The method of claim 1, wherein] A method comprising:

selecting a subset of active antennas from a plurality of available antennas in a multi-element antenna system based on higher-order statistics of a propagation medium where said selecting comprises determining a subset including M_T active transmit antennas [by solving for] substantially in accordance with the equation

$$(M_T, p) = \arg\max_{(\tilde{M}_T, \tilde{p})} \frac{\lambda \min(\mathrm{R}_T(\tilde{M}_T, \tilde{p}))}{\tilde{M}_T(2^{b_T/\tilde{M}_T} - 1)} \cdot \bar{\lambda}_{\min}(\mathrm{H}_w^*(K_R, \tilde{M}_T)\mathrm{H}_w(K_R, \tilde{M}_T)).$$

10.　　　(Currently Amended) The method of claim [1]4, further comprising allocating substantially equal power to each of said active antennas.

11.　　　(Currently Amended) [The method of claim 1, wherein] A method comprising:

selecting a subset of active antennas from a plurality of available antennas in a multi-element antenna system based on higher-order statistics of a propagation medium where said selecting comprises determining a subset including M_T active transmit antennas [by solving for]

substantially in accordance with the equation

$$(M_T, p) = \arg \max_{(\widetilde{M}_T, \widetilde{p})} \left\{ \frac{1}{\widetilde{M}_T} \left[\ln \det\left(R_T(\widetilde{M}_T, \widetilde{p})\right) + \sum_{j=1}^{\widetilde{M}_T} \sum_{i=1}^{K_R - j} \frac{1}{i} - b_T \ln 2 \right] - \ln \widetilde{M}_T \right\}.$$

12.   (Cancelled)

13.   (Currently Amended) The apparatus of claim [12]15, wherein the higher-order

statistics comprise second-order statistics of the propagation medium.

14.   (Cancelled)

15.   (Currently Amended) An apparatus comprising:

a processor operative to select a subset of active antennas from a plurality of available

antennas based on higher-order statistics of a propagation medium, wherein the processor is

operative to select a constellation for transmission on the active antennas and [The apparatus of

claim 14, where the processor is operative] to select different constellations for two or more of

the active antennas.

16.   (Currently Amended) The apparatus of claim [12]15, where[in] the apparatus

comprises at least a portion of a multiple-in multiple-out (MIMO) device.

17.   (Currently Amended) The apparatus of claim [12,]15 where[in] the processor is

operative to select the subset of active antennas based on correlation matrices among the active

antennas.

18.   (Currently Amended) An apparatus comprising:

a processor operative to select a subset of active antennas from a plurality of available

antennas based on higher-order statistics of a propagation medium where [The apparatus of

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claim 12,] the processor is operative to select an optimum number of antennas to maximize a minimum signal-to-noise ratio (SNR) margin.

19.   (Currently Amended) The apparatus of claim [12]15, where the processor is operative to select the subset of active antennas based on a fixed data rate.

20.   (Currently Amended) [The apparatus of claim 12] An apparatus comprising:

a processor operative to select a subset of active antennas from a plurality of available antennas based on higher-order statistics of a propagation medium where the processor is operative to select a subset including M_T active transmit antennas [by solving for] substantially in accordance with the equation

$$(M_T, p) = \arg\max_{(\tilde{M}_T, \tilde{p})} \frac{\lambda\min(R_T(\tilde{M}_T, \tilde{p}))}{\tilde{M}_T(2^{b_T/\tilde{M}_T} - 1)} \cdot \overline{\lambda}_{min}(H_w^*(K_R, \tilde{M}_T)H_w(K_R, \tilde{M}_T)).$$

21.   (Currently Amended) The apparatus of claim [12,]15 where the processor is operative to allocate substantially equal power to each of said active antennas.

22.   (Currently Amended) [The apparatus of claim 12,] An apparatus comprising:

a processor operative to select a subset of active antennas from a plurality of available antennas based on higher-order statistics of a propagation medium where the processor is operative to select a subset including M_T active transmit antennas [by solving for] substantially in accordance with the equation

$$(M_T, p) = \arg\max_{(\tilde{M}_T, \tilde{p})}\left\{\frac{1}{\tilde{M}_T}\left[\ln\det(R_T(\tilde{M}_T, \tilde{p})) + \sum_{j=1}^{\tilde{M}_T}\sum_{i=1}^{K_R-j}\frac{1}{i} - b_T\ln 2\right] - \ln\tilde{M}_T\right\}.$$

23.   (Cancelled)

24.   (Currently Amended) The apparatus of claim [23]26, wherein the higher-order

statistics comprise second-order statistics of the propagation medium.

25.   (Cancelled)

26.   (Currently Amended) An apparatus comprising:

a processor including means for selecting a subset of active antennas from a plurality of

available antennas based on higher-order statistics of a propagation medium and means for

selecting a constellation for transmission on the active antennas including [The apparatus of

claim 25, further comprising] means for selecting different constellations for two or more of the

active antennas.

27.   (Currently Amended) The apparatus of claim [23]26, where[in] the apparatus

comprises at least a portion of a multiple-in multiple-out (MIMO) device.

28.   (Currently Amended) The apparatus of claim [23,]26 further comprising means

for selecting the subset of active antennas based on correlation matrices among the active

antennas.

29.   (Currently Amended) An apparatus comprising:

a processor including means for selecting a subset of active antennas from a plurality of

available antennas based on higher-order statistics of a propagation medium [The apparatus of

claim 23], where[in] said selecting comprises selecting an optimum number of antennas to

maximize a minimum signal-to-noise ratio (SNR) margin.

30.   (Currently Amended) The apparatus of claim [23]26, further comprising means

for selecting the subset of active antennas based on a fixed data rate.

31.   (Currently Amended) [The apparatus of claim 23, further comprising] <u>An</u>
<u>apparatus comprising:</u>

<u>a processor including means for selecting a subset of active antennas from a plurality of</u>
<u>available antennas based on higher-order statistics of a propagation medium and</u> means for
determining a subset including M_T active transmit antennas [by solving for] <u>substantially in</u>
<u>accordance with</u> the equation

$$(M_T, p) = \arg\max_{(\widetilde{M}_T, \widetilde{p})} \frac{\lambda\min(R_T(\widetilde{M}_T, \widetilde{p}))}{\widetilde{M}_T(2^{b_T/\widetilde{M}_T} - 1)} \cdot \overline{\lambda}_{\min}(H_w^*(K_R, \widetilde{M}_T)H_w(K_R, \widetilde{M}_T)).$$

32.   (Currently Amended) The apparatus of claim [23]<u>26,</u> further comprising means
for allocating substantially equal power to each of said active antennas.

33.   (Currently Amended) [The apparatus of claim 23, further comprising] <u>An</u>
<u>apparatus comprising:</u>

<u>a processor including means for selecting a subset of active antennas from a plurality of</u>
<u>available antennas based on higher-order statistics of a propagation medium and</u> means for
determining a subset including M_T active transmit antennas [by solving for] <u>substantially in</u>
<u>accordance with</u> the equation

$$(M_T, p) = \arg\max_{(\widetilde{M}_T, \widetilde{p})} \left\{ \frac{1}{\widetilde{M}_T} \left[\ln\det(R_T(\widetilde{M}_T, \widetilde{p})) + \sum_{j=1}^{\widetilde{M}_T} \sum_{i=1}^{K_R - j} \frac{1}{i} - b_T \ln 2 \right] - \ln\widetilde{M}_T \right\}.$$

34.   (Cancelled)

35.   (Currently Amended) The method of claim [34]<u>37,</u> wherein the higher-order
statistics comprise second-order statistics of the propagation medium.

36.   (Cancelled)

37.   (Currently Amended) A system comprising:

a propagation medium;

a first transceiver including a plurality of available antennas;

a second transceiver including

a plurality of available antennas

a processor operative to determine higher-order statistics of the propagation medium

from signals received from the plurality of available antennas at the first transceiver; and

an antenna selection module operative to select a subset of active antennas from the

plurality of available antennas based on higher-order statistics of the propagation medium [The

system of claim 36], where[in] the processor is operative to select a constellation for

transmission on the active antennas and select different constellations for two or more of the

active antennas.

38.   (Currently Amended) The system of claim [34]37, where[in] the system

comprises at least a portion of a multiple-in multiple-out (MIMO) device.

39.   (Currently Amended) The system of claim [34,]37 where[in] the processor is

operative to select the subset of active antennas based on correlation matrices among the active

antennas.

40.   (Currently Amended) A system comprising:

a propagation medium;

a first transceiver including a plurality of available antennas;

a second transceiver including

a plurality of available antennas

a processor operative to determine higher-order statistics of the propagation medium

from signals received from the plurality of available antennas at the first transceiver; and

an antenna selection module operative to select a subset of active antennas from the

plurality of available antennas based on higher-order statistics of the propagation medium,

_____ where[The system of claim 34,] the processor is operative to select an optimum number

of antennas to maximize a minimum signal-to-noise ratio (SNR) margin.

41.   (Currently Amended) The system of claim [34,]37 where the processor is

operative to select the subset of active antennas based on a fixed data rate.

42.   (Currently Amended) [The system of claim 34] A system comprising:

a propagation medium;

a first transceiver including a plurality of available antennas;

a second transceiver including

a plurality of available antennas

a processor operative to determine higher-order statistics of the propagation medium

from signals received from the plurality of available antennas at the first transceiver; and

an antenna selection module operative to select a subset of active antennas from the

plurality of available antennas based on higher-order statistics of a propagation medium,

where the processor is operative to select a subset including M_T active transmit antennas

[by solving for] substantially in accordance with the equation

$$(M_T, p) = \arg\max_{(\tilde{M}_T, \tilde{p})} \frac{\lambda \min(R_T(\tilde{M}_T, \tilde{p}))}{\tilde{M}_T(2^{b_T/\tilde{M}_T} - 1)} \cdot \bar{\lambda}_{\min}(H_w^*(K_R, \tilde{M}_T)H_w(K_R, \tilde{M}_T)).$$

43.   (Currently Amended) The system of claim [34,]37 where the processor is

operative to allocate substantially equal power to each of said active antennas.

44.   (Currently Amended) [The system of claim 34,] A system comprising:

a propagation medium:

a first transceiver including a plurality of available antennas:

a second transceiver including

a plurality of available antennas

a processor operative to determine higher-order statistics of the propagation medium

from signals received from the plurality of available antennas at the first transceiver; and

an antenna selection module operative to select a subset of active antennas from the

plurality of available antennas based on higher-order statistics of the propagation medium,

where the processor is operative to select a subset including M_T active transmit antennas

[by solving for] substantially in accordance with the equation

$$(M_T, p) = \arg \max_{(\tilde{M}_T, \tilde{p})} \left\{ \frac{1}{\tilde{M}_T} \left[\ln \det\left(R_T(\tilde{M}_T, \tilde{p}) \right) + \sum_{j=1}^{\tilde{M}_T} \sum_{i=1}^{K_R - j} \frac{1}{i} - b_T \ln 2 \right] - \ln \tilde{M}_T \right\}.$$

45.   (Cancelled)

46.   (Currently Amended) The computer program of claim [45]48, wherein the

higher-order statistics comprise second-order statistics of the propagation medium.

47.   (Cancelled)

48.   (Currently Amended) A computer program comprising the steps of:

selecting a subset of active antennas from a plurality of available antennas in an multi-element antenna system based on higher-order statistics of a propagation medium; and

selecting a constellation for transmission on the active antennas including [The computer program of claim 47, wherein said selecting the constellation for transmission on the active antennas comprises] selecting different constellations for two or more of the active antennas.

49.   (Currently Amended) The computer program of claim [45,]48 where[in] the multi-element antenna system comprises a multiple-in multiple-out (MIMO) system.

50.   (Currently Amended) The computer program of claim [45,]48 where[in] said selecting comprises selecting the subset of active antennas based on correlation matrices among the active antennas.

51.   (Currently Amended) A computer program comprising the steps of:

selecting a subset of active antennas from a plurality of available antennas in an multi-element antenna system based on higher-order statistics of a propagation medium [The computer program of claim 45,] where[in] said selecting comprises selecting an optimum number of antennas to maximize a minimum signal-to-noise ratio (SNR) margin.

52.   (Currently Amended) The computer program of claim [45,]48 where[in] said selecting comprises selecting the subset of active antennas based on a fixed data rate.

53.   (Currently Amended) [The computer program of claim 45,] A computer program comprising the steps of:

selecting a subset of active antennas from a plurality of available antennas in an multi-element antenna system based on higher-order statistics of a propagation medium, wherein said

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selecting comprises determining a subset including M_T active transmit antennas [by solving for]

<u>substantially in accordance with</u> the equation

$$(M_T, p) = \underset{(\tilde{M}_T, \tilde{p})}{\arg \max} \frac{\lambda \min(R_T(\tilde{M}_T, \tilde{p}))}{\tilde{M}_T(2^{b_T/\tilde{M}_T} - 1)} \cdot \overline{\lambda}_{\min}(H_w^*(K_R, \tilde{M}_T)H_w(K_R, \tilde{M}_T)).$$

54.   (Currently Amended) The computer program of claim [45,]<u>48</u> further comprising

generating a signal operative to allocate substantially equal power to each of said active

antennas.

55.   (Currently Amended) [The computer program of claim 45,] <u>A computer program</u>

<u>comprising the steps of:</u>

<u>selecting a subset of active antennas from a plurality of available antennas in an multi-</u>

<u>element antenna system based on higher-order statistics of a propagation medium,</u> wherein said

selecting comprises determining a subset including M_T active transmit antennas [by solving for]

<u>substantially in accordance with</u> the equation

$$(M_T, p) = \underset{(\tilde{M}_T, \tilde{p})}{\arg \max} \left\{ \frac{1}{\tilde{M}_T} \left[\ln \det(R_T(\tilde{M}_T, \tilde{p})) + \sum_{j=1}^{\tilde{M}_T} \sum_{i=1}^{K_R-j} \frac{1}{i} - b_T \ln 2 \right] - \ln \tilde{M}_T \right\}.$$

56.   (New) The method of claim 37, wherein the higher-order statistics comprise

second-order statistics of the propagation medium.

57.   (New) The method of claim 40, wherein the higher-order statistics comprise

second-order statistics of the propagation medium.

58.   (New) The method of claim 42, wherein the higher-order statistics comprise

second-order statistics of the propagation medium.

59.   (New) The method of claim 44, wherein the higher-order statistics comprise

second-order statistics of the propagation medium.